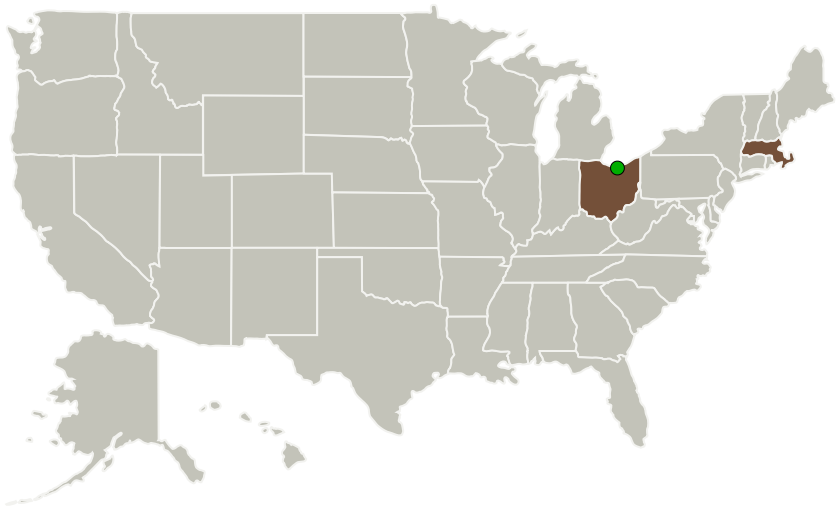
Lifetime Improvement of Large Scale Green Monopropellant Thrusters via Novel, Long-Life Catalysts, Phase I

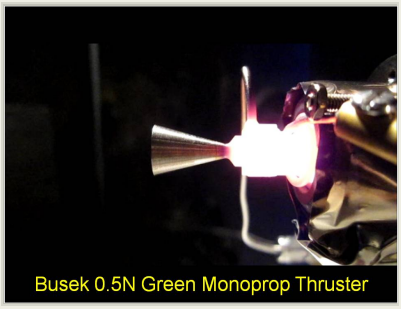
Completed Technology Project (2013 - 2013)

Project Introduction

Busek proposes to develop a high performance, non-toxic storable, "green" monopropellant thruster suitable for in-space reaction control propulsion. The engine will deliver 100N (~25lbf) vacuum thrust with specific impulse exceeding 240sec. Estimated Isp-density is on the order of 348 sec-g/cc, a 48% increase from the state-of-the-art hydrazine systems. The most important feature that sets this thruster apart from other similar devices will be the use of an innovative, long-life catalyst. This proprietary catalyst, constructed without any bed plate or ceramic substrate, was recently demonstrated in Busek's 0.5N micro thruster. It has shown the ability to suppress catalyst-related performance degradation problems that often plague green monopropellant thrusters. The proposed Phase I program will focus on developing a 5N green monopropellant thruster by scaling up the long-life catalyst design from the 0.5N thruster. Both empirical and modeling works are proposed to validate the scaling theory. Thruster performance will be evaluated based on hot-firing test results that include c* and vacuum thrust measurements. The Phase I findings will lead to the design of a full-scale, 100N green monopropellant thruster to be developed in Phase II.

Primary U.S. Work Locations and Key Partners





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Organizations Performing Work	Role	Type	Location
Busek Company, Inc.	Lead Organization	Industry Women-Owned Small Business (WOSB)	Natick, Massachusetts
Glenn Research Center(GRC)	Supporting Organization	NASA Center	Cleveland, Ohio

Primary U.S. Work Locations	
Massachusetts	Ohio

Project Transitions

May 2013: Project Start

November 2013: Closed out

Closeout Documentation:

- Final Summary Chart*(https://techport.nasa.gov/file/140394)*

Organizational Responsibility

Responsible Mission Directorate:

Space Technology Mission Directorate (STMD)

Lead Organization:

Busek Company, Inc.

Responsible Program:

Small Business Innovation Research/Small Business Tech Transfer

Project Management

Program Director:

Jason L Kessler

Program Manager:

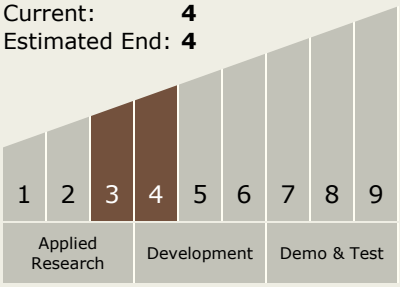
Carlos Torrez

Principal Investigator:

Michael Tsay

Technology Maturity (TRL)

Start: **3**
Current: **4**
Estimated End: **4**



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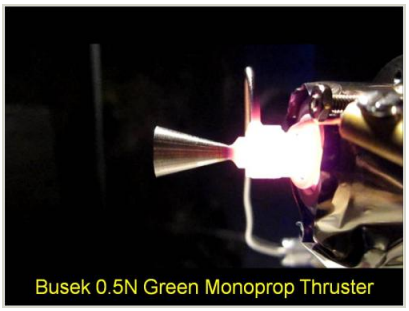
Images



Project Image
Lifetime Improvement of Large Scale Green Monopropellant Thrusters via Novel, Long-Life Catalysts
(https://techport.nasa.gov/image/133244)

Technology Areas

Primary:

- TX01 Propulsion Systems
  - TX01.1 Chemical Space Propulsion
    - TX01.1.2 Earth Storable

Target Destinations

The Sun, Earth, The Moon, Mars, Others Inside the Solar System, Outside the Solar System